

What is claimed is:

1. A process for removing trioxane from a mixture I of formaldehyde, trioxane and water, by
 - a) distilling the mixture I in a first distillation stage at a pressure of from 0.1 to 2 bar to obtain a stream II which comprises formaldehyde and a stream III which comprises predominantly trioxane and additionally water and formaldehyde,
 - b) mixing the stream III with a recycle stream VII which comprises predominantly trioxane and additionally water and formaldehyde to obtain a stream IIIa which comprises predominantly trioxane and additionally water and formaldehyde,
 - c) distilling the stream IIIa, if appropriate after removing low boilers from the stream III or IIIa in a further distillation stage, in a second distillation stage at a pressure of from 0.2 to 10 bar, the pressure in the second distillation stage being at least 0.1 bar higher than the pressure in the first distillation stage, to obtain a stream IV of trioxane and a stream V which comprises predominantly trioxane and additionally water and formaldehyde,
 - d) distilling the stream V in a third distillation stage at a pressure of from 0.1 to 4 bar to obtain a stream VI which comprises predominantly water and additionally formaldehyde, and the recycle stream VII which comprises predominantly trioxane and additionally water and formaldehyde,
 - e) if appropriate, distilling the stream VI in a fourth distillation stage to obtain a stream VIII which comprises predominantly water, and a stream IX which comprises predominantly formaldehyde.
2. The process according to claim 1, wherein the pressure in the second distillation stage is from 0.5 to 10 bar higher than the pressure in the first distillation stage.
3. The process according to claim 1 or 2, wherein the first distillation stage is carried out at a pressure of from 0.5 to 2 bar and the second distillation stage at a pressure of from 2.5 to 8 bar.

4. The process according to any of claims 1 to 3, wherein the third distillation stage is carried out at a pressure of from 0.1 to 1 bar.
5. The process according to any of claims 1 to 4, wherein the first distillation stage is carried out in a distillation column having at least two theoretical plates, the second distillation stage in a distillation column having at least 2 theoretical plates and the third distillation stage in a distillation column having at least one theoretical plate.
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6. The process according to any of claims 1 to 5, characterized by the following composition of streams I-VII:
 - 15 stream I: from 35 to 80% by weight of formaldehyde, from 25 to 45% by weight of water, from 1 to 30% by weight of trioxane;
 - stream II: from 51 to 80% by weight of formaldehyde, 20 to 49% by weight of water, 0 to 1% by weight of trioxane;
 - 20 stream III: from 1 to 15% by weight of formaldehyde, 15 to 35% by weight of water, 60 to 80% by weight of trioxane;
 - stream IIIa: from 3 to 20% by weight of formaldehyde, 10 to 30% by weight of water, 60 to 80% by weight of trioxane;
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 - stream IV: from 95 to 100% by weight of trioxane, 0 to 5% by weight of water and secondary components;
 - 30 stream V: from 5 to 20% by weight of formaldehyde, 15 to 35% by weight of water, 50 to 80% by weight of trioxane;
 - stream VI: from 10 to 25% by weight of formaldehyde, 75 to 90% by weight of water, 0 to 1% by weight of trioxane;
 - 35 stream VII: from 5 to 20% by weight of formaldehyde, 10 to 30% by weight of water, 60 to 80% by weight of trioxane,
and the streams I, III, IIIa, V and VII may also contain up to 15% by weight of low boilers selected from the group consisting of methyl formate, methylal, dimethoxydimethyl ether, trimethoxydimethyl ether, methanol, formic acid, and also further hemiacetals and full acetals.
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7. The process according to any of claims 1 to 6, wherein a low boiler removal is undertaken in a further distillation stage between the first and the second distillation stage.

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8. A process for preparing trioxane from an aqueous formaldehyde solution, by feeding a stream X of an aqueous formaldehyde of a trioxane synthesis stage and converting it under acidic conditions to obtain the mixture I, and removing trioxane from the steam I by the process according to any of claims 1 to 6.

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9. The process according to claim 8, wherein a separate trioxane synthesis stage is carried out and precedes the first distillation stage.

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10. The process according to claim 8, wherein the trioxane synthesis stage and the first distillation stage are carried out together as a reactive distillation.

11. The process according to any of claims 8 to 10, wherein the stream X contains from 55 to 85% by weight of formaldehyde and from 15 to 45% by weight of water.

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12. The process according to any of claims 8 to 11, wherein the stream X is obtained from an aqueous formaldehyde solution of low formaldehyde concentration by concentrating in an evaporator.

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13. The use of trioxane, preparable by the process according to any of claims 8 to 12, for preparing polyoxymethylene (POM), polyoxymethylene derivatives and diaminodiphenylmethane (MDA).